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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/817,527	04/01/2004	Daniel Krahmer	17979-006002	4867
26161	7590	04/12/2005	EXAMINER	
FISH & RICHARDSON PC 225 FRANKLIN ST BOSTON, MA 02110			JUBA JR, JOHN	
			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 04/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/817,527

Applicant(s)

KRAHMER ET AL.

Examiner

John Juba, Jr.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 January 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-83 is/are pending in the application.

4a) Of the above claim(s) 9-17, 21-22, 25-27, 37, 38, 40-42, 46, 47, 49-51, 55-81, 83 is/are withdrawn from consideration.

- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

- 6) ☒ Claim(s) 1, 3, 7, 8, 18-20, 23, 24, 28-30, 32-36, 39, 43-45, 48, 52-54 and 82 is/are rejected.

- 7) ☒ Claim(s) 2, 4-6 and 31 is/are objected to.

- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☒ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date (4).
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

Claims 57 – 81 and 83 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention; claims 9 – 17, 21, 22, 25 – 27, 37, 38, 40 – 42, 46, 47, 49 – 51, 55 and 56 are withdrawn as being drawn to non-elected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on January 24, 2005.

### ***Priority (not recognized)***

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Germany on May 15, 2001; May 23, 2001; June 6, 2001; and March 12, 2002. It is noted, however, that applicant has not filed a certified copies of the German applications as required by 35 U.S.C. 119(b).

The benefit of earlier filing under 35 U.S.C. §120 based upon prior filed international application number PCT/EP02/05050 (05/08/2002) is contingent upon copendency of parent U.S. application serial number 10/367,989 with the international application. Similarly, the benefit of earlier filing in Germany under 35 U.S.C. §119(a-d) based upon application numbers 10123725.1(05/15/2001); 10123727.8 (05/15/2001); 10125487.3 (05/23/2001); and 10127320.7 (06/06/2001) is only by way of parent application serial number 10/367,989 and prior filed international application number PCT/EP02/05050, filed May 8, 2002.

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►The examiner is not able to review the international application file for copendency. Thus, evidence of copendency is required in order to grant the benefit of earlier filing. Such evidence should include certification from applicant that neither the international application nor the designation of the United States was withdrawn or considered to be withdrawn prior to the filing date of the U.S. national application. MPEP 1895.

The benefit of earlier filing based upon German application serial number 10210782.3 (03/12/2002) is available to applicants under 35 U.S.C. §119(a-d). However, at this juncture, the examiner cannot ascertain what subject matter is supported by the German application in the context of 35 U.S.C. §112, first paragraph.

#### ***Information Disclosure Statement***

All of the references cited (to date) in parent application serial number 10/367,989 have been considered. These references are cited in Applicants' Information Disclosure Statements of July 1, September 16, and November 10, 2004 and February 11, 2005.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

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applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 8, 18, 20, 23, 24, 28, 32, 33, 35, 36, 39, and 54 are rejected under 35 U.S.C. 102(e) as being anticipated by Hoffman, et al (U.S. Patent number 6,683,710; of record). Beginning with claim 18, and referring *for example* to the discussion of Figure 10 (esp. Col. 21, lines 54+), Hoffman, et al disclose an optical system comprising four  $\text{CaF}_2$  lenses (52)(54)(56)(58), the lenses having their lens axes oriented in a principle crystallographic orientation [110], wherein an image point (50) [of some source, not illustrated] is formed at a convergence of a bundle of light rays each of which *inherently* has an azimuth angle  $\alpha_R$ , an aperture angle  $\theta_R$ , and an optical path difference  $\Delta\text{OPL}$  ("retardance") for two mutually orthogonal states of linear polarization, wherein the lenses are arranged with a rotation relative to each other about the lens axes in such a manner that a distribution  $\Delta\text{OPL}(\alpha_R, \theta_R)$  of the optical path differences of the bundle of rays as a function of the azimuth angle  $\alpha_R$  and of the aperture angle  $\theta_R$  has significantly reduced values of  $\Delta\text{OPL}$  in comparison to an arrangement where said lenses are likewise oriented in said principal crystallographic direction but are not arranged with said rotation relative to each other [see discussion of Fig. 14A *vis á vis* Fig. 11A; wherein the aggregate  $\Delta\text{OPL}(\alpha_R, \theta_R)$  in Fig. 11A should be scaled down by a factor of 4/5 for a direct comparison of *four* unclocked elements the results of four clocked elements.] The characterization of the optical system as "an objective" appears to be directed to the manner in which the optical system is intended to be used, rather than to any distinguishing structural features of the optical system itself.

With regard to claim 23, the numerical aperture (0.707) is larger than 0.7 on the object side, and the operating wavelength is about 157 nm. Hoffman, et al anticipate that the optical systems will have numerical apertures from 0.6 – 0.9 (Col. 12, lines 34 – 37).

With regard to claim 28 and its dependent claims, the rotations  $\gamma$  between the elements are determined in accordance with their intrinsic birefringence profiles,  $\Delta n(\alpha_R, \theta_R)$ . There are four elements ( $n=4$ ) with their axes oriented along the [110] direction, where the  $\text{CaF}_2$  crystal lenses exhibit 2-fold symmetry in their birefringence profiles. The angle between two of the elements (the first two) is  $35.264^\circ$  which satisfies the relation  $\gamma = 360^\circ/(2 \cdot 4) + 0 \cdot (360^\circ/2) - 9.736^\circ$ .

With regard to claims 33 and 34, the lenses are arranged next to each other, as evident by inspection. Further, Hoffman, et al anticipate other embodiments including two composite lens elements (L27A)/(L27B) and (L28A)/(L28B), each comprising two crystal elements mutually rotated and joined to reduce retardance (Col. 36, lines 19+). The recitation of the elements as having been joined by wringing is directed to the manner in which the composite lenses are made, rather than to the structure of the lenses themselves. However, it is believed that one of ordinary skill would understand that lenses joined by wringing have no air space between them. In the instant case, the lenses of Hoffman, et al have surfaces which mate with the same radii (Col. 36, lines 19+), and which thus comprise a "buried surface" (Col. 37, line 53). The examiner believes that this fairly conveys that the elements are joined without an air space in between.

With particular regard to claim 35, the system may be regarded as comprising a first group (52)(54) and a second group (56)(58), wherein the lenses within each group are rotated with respect to each other.

With particular regard to claim 39, the numerical aperture (0.707) is larger than 0.7 on the object side, and the operating wavelength is about 157 nm.

With regard to claims 1, 8, 20 and 36, Hoffman, et al anticipate "other embodiments" wherein a plurality of "elements having their [111] crystal axes aligned along the optical axis" will be used or included (Col. 24, lines 3+). It is clear from the discussion leading to Figure 5A, that Hoffman, et al anticipate  $\text{CaF}_2$  lenses with their lens axes oriented along the [111] direction. It will be appreciated that  $\text{CaF}_2$  is of cubic crystalline form, and when oriented in this manner has three-fold symmetry in birefringence.

With particular regard to claim 54, Hoffman, et al are clearly describing portions of an objective to be used in their lithographic system. The examiner believes that with *a priori* knowledge of the system numerical aperture, the step of plotting the pupil function in Figure 11A, includes the step of determining the optical path differences  $\Delta\text{OPL}$  as a function of aperture angle  $\theta_R$  as well as azimuth angle,  $\alpha_R$ .

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 7, 43, 44, 45, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman, et al (U.S. Patent number 6,683,710). As set forth above with regard to claims 1, 20, 28, and 36, Hoffman, et al disclose the invention substantially as claimed. However, Hoffman, et al do not disclose the particulars of rotating at least two cubic crystalline lenses with their lens axes oriented along the [111] direction. Nonetheless, it is clear from the discussion of the tabulated embodiments that Hoffman, et al teach selection of the appropriate clocking angles in accordance with the lens axis orientations and the concomitant symmetry <sup>of</sup> birefringence. Thus, it appears that one of ordinary skill would arrived at the recited arrangements through only routine experimentation and optimization performed in the manner suggested by Hoffman, et al.

Claims 52, 53, and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over NIKON Corp (EP 1138139 A1), in view of Hoffman, et al (U.S. Patent number 6,683,710). Referring *initially* to Figure 5, NIKON disclose a microlithography system comprising an illumination system (2)(43)(44)(46)(10)(152)(153)(154)(157) and further comprising an objective (PL), wherein the objective projects an image of a mask (R) carrying a structure onto a light sensitive substrate (W). Details of the objective are given for example in connection with the seventh embodiment (Table 8; Pg. 45), wherein the objective comprises a plurality of fused silica lenses and at least two (seven) CaF<sub>2</sub> lenses. Thus, NIKON disclose the invention substantially as claimed. However, NIKON do not disclose rotation of the lenses.



In the same field of endeavor, Hoffman, et al suggest modifying the seventh embodiment of NIKON (as discussed in connection with Hoffman's Fig. 1). Turning to the discussion of the fourth embodiment (Fig. 31; Col. 32, lines 55+), Hoffman, et al disclose the objective as comprising seven  $\text{CaF}_2$  lenses (L14)(L19)(L20)(L21)(L24)(L25), and (L26) [in correspondence with the NIKON prescription] having their lens axes oriented along a principal crystal direction [110] (Table 13). Hoffman, et al teach the improved imaging is obtained by reducing the retardance at the image plane, and teach that reduction in retardance is achieved by prescribing the relative rotations of the lens elements about the optical axis to correct for intrinsic birefringence (Col. 35, lines 5 – 11; and as previously discussed in connection with claim 18, above).

It would have been obvious to one of ordinary skill to one of ordinary skill to arranged the lenses of NIKON in such a manner that a distribution  $\Delta\text{OPL}(\alpha_R, \theta_R)$  of the optical path differences of the bundle of rays as a function of the azimuth angle  $\alpha_R$  and of the aperture angle  $\theta_R$  has significantly reduced values of  $\Delta\text{OPL}$  in comparison to an arrangement where said lenses are likewise oriented in said principal crystallographic direction but are not arranged with said rotation relative to each other, since Hoffman, et al teach that such arrangement permits improved imaging in an apparatus and objective according to NIKON.

With regard to claim 82, the objective of Hoffman, et al includes two composite lens elements (L27A)/(L27B) and (L28A)(L28B), each comprising two crystal elements mutually rotated and joined to reduce retardance (Col. 36, lines 19+). Further, Hoffman, et al suggest that any residual retardance can be compensated for by the inclusion of

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one or more wave plates (Col. 25, lines 49 – 54). Thus, it would have been obvious to one of ordinary skill to provide at least one composite lens elements comprising a plurality of crystal plates, since Hoffman, et al suggest a plurality of plates as a means to further reduce retardance. It is believed that since Hoffman, et al teach constructing the objective using crystalline materials, one of ordinary skill would at once envisage wave plates which were of crystalline material. The selection of these known materials based upon their disclosed suitability for reducing retardance, would appear to have been obvious. The characterization of the composite lens elements of Hoffman, et al as comprising a "buried surface" (Col 37, line 53) fairly conveys that the elements are joined without an air space in between. It was well known to those skilled in the art that the removal of any air space between optical elements improves radiometric efficiency through reduced Fresnel losses. Thus, joining the wave plates suggested by Hoffman, et al without an air space therebetween would have been obvious in the interest of improving efficiency, as was well known.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 18, 19, 20, 28, 29, 30, 32, 33, 35, 52, and 53 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 8, 9, 17, 10, 11, 12, 14, 15, 16, 47, and 48 of copending Application No. 10/931,745; claim 23 is provisionally rejected under this doctrine as being unpatentable over each of claims 41 – 46 of copending Application No. 10/931,745. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are *broader* than the copending claims by omission of the recitation of each lens or lens part as

“having optical surfaces; and a compensation coating on at least one optical surface, the compensation coating being designed in such a way that the distribution of the optical path difference  $\Delta OPL(\alpha_R, \theta_R)$  of the bundle of rays as a function of the azimuth angle  $\alpha_R$  and of the aperture angle  $\theta_R$  has significantly reduced values in comparison with an objective without a compensation coating.”

Thus, the claims of the instant application generically dominate the copending claims such that a structure that infringes the copending claims necessarily infringes the claims of the instant application. Further, barring some *unexpectedly* improved result arising from omission of the compensation coating, it appears that such omission would have been a obvious expedient to providing a projection lens made less-expensively.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Allowable Subject Matter***

Claims 2, 4 – 6, and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Subject to the aforementioned double-patenting rejection, claims 19, 29, and 30 distinguish over the prior art. The following is a statement of reasons for the indication of allowable subject matter: The prior art, taken alone or in combination, fails to teach or fairly suggest the *combination* particularly wherein the optical characteristics particularly (and variously) recited in claims 2, 4 – 6, 19, and 29 – 31 are achieved.


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Juba whose telephone number is (571) 272-2314. The examiner can normally be reached on Mon.-Fri. 9 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Drew Dunn whose number is (571) 272-2312 and who can be reached on Mon.- Thu., 9 – 5.

The centralized fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306 for *all* communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2800.

  
**JOHN JUBA, JR.**  
**PRIMARY EXAMINER**  
**Art Unit 2872**

April 11, 2005